

1970

**OPERATING
SUMMARY**

NEWMARKET - E. GWILLIMBURY

***water pollution
control plant***

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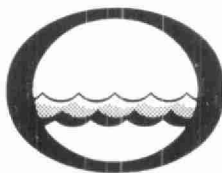
Division of Plant Operations

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Water management in Ontario

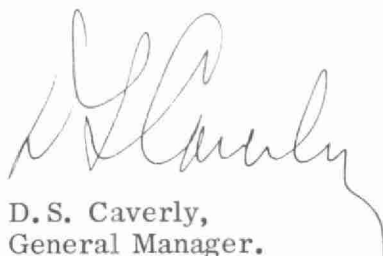
Ontario
Water Resources
Commission

135 St. Clair Ave. W.
Toronto 195
Ontario


Once again we have the privilege of submitting to you our latest detailed report on financial progress and technical activity at your water pollution control plant.

The statistical information contained in this annual operating summary will undoubtedly be a useful barometer of efficiency. Of particular interest will be the comments and recommendations of the regional operations engineer, who was intimately connected with day-to-day operation throughout 1970.

Together with the extensive cost data provided, this information should assist greatly in your general understanding of the problems met and dealt with, and in furnishing a yardstick for possible future expansion.



D. S. Caverly,
General Manager.



D. A. McTavish, P. Eng.,
Director,
Division of Plant Operations.

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NEWMARKET-EAST GWILLIMBURY
water pollution control plant

operated for

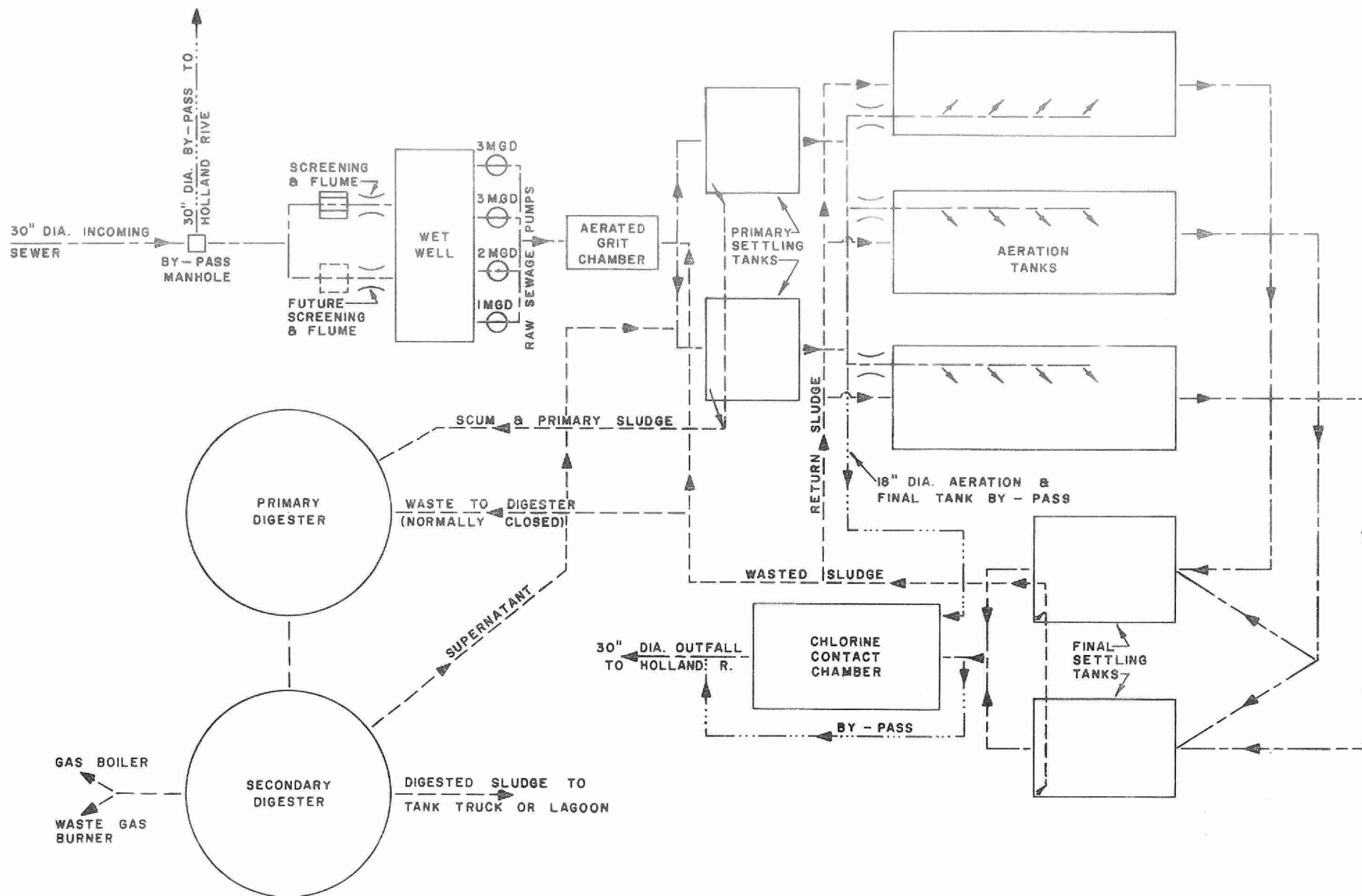
THE TOWN OF NEWMARKET

by the

ONTARIO WATER RESOURCES COMMISSION

1970 ANNUAL OPERATING SUMMARY

FLOW CHART



DESIGN DATA

PROJECT NO.	2-0087-61	TREATMENT	Activated Sludge
DESIGN FLOW	2.0 mgd	DESIGN POP.	Newmarket 9,200 E. Gwillimbury 10,000
BOD - Raw Sewage	220 mg/l	SS - Raw Sewage	212 mg/l
- Removal	90%	- Removal	90%

PRIMARY TREATMENT

Screening

- in East Channel; 1" spacing

Raw Sewage Pumps

Type: Smart Turner
 Size: Two 1875 gpm @ 30' tdh
 One 1560 gpm @ 30' tdh
 One 1000 gpm @ 30' tdh

Grit Removal

Type: Aerated, grit removed by air lift
 Size: Two 14.3' x 6' x 9.1' swd (9,700 gal)
 Retention: 7 min
 Air Supply: One Sutorbilt
 130 scfm @ 8 psi

Primary Sedimentation

Type: Eimco
 Size: Two 30' x 30' x 11.7' swd (131,000 gal)
 Retention: 1.57 hr
 Loading: Surface, 1110 gal/ft²/day
 Weir, 10,800 gal/ft/day

SECONDARY TREATMENT

Aeration Tanks

Type: Mechanical; single-pass
 Size: Three 90' x 30' x 10.7' (107,500 cu ft or 0.67 mil gal)
 Retention: 8.0 hr

Aerators

- Twelve Simcar

Secondary Sedimentation

Type: Eimco
 Size: Two 35' x 35' x 13' swd (197,000 gal)
 Retention: 2.4 hr
 Loading: Surface, 840 gal/ft²/day
 Weir, 7,870 gal/ft/day

CHLORINATION

W & T

Chlorine Contact Chamber

Size: One 61.4' x 9' x 10.1' (34,800 gal)
 Retention: 25 min

OUTFALL

- to Holland River

SLUDGE HANDLING

Digestion System - Two-stage

Primary --

Type: Gas mixed concrete
 C. P. Lammert gas comp.
 Size: One 40 dia x 21.25 swd (26,800 cu ft or 0.167 mil gal)
 Loading: 2.9 lb/cu ft/mo

Secondary -- concrete

Size: One 40' dia x 23' swd (28,950 cu ft or 0.18 mil gal)
 Total Loading: 1.4 lb/cu ft/mo

'70 REVIEW

FLOWS	DAILY FLOW mil gal	OCCURRING IN THE MONTH OF	MONTHLY FLOW mil gal	OCCURRING IN THE MONTH OF
Average	1.58	—	48.2	—
High	4.40	April	68.9	April
Low	1.00	March	40.8	August

GENERAL

The Newmarket/East Gwillimbury plant is a two million gallon per day secondary treatment facility. The treated effluent is discharged to the Holland River downstream of Newmarket. The project is operated by a chief operator, two operators and a groundsman.

During the year an aerator gear drive was damaged due to a loose key, resulting in one tank being out of service for a portion of the summer. Efforts continued throughout the year to determine the cause of the noisy lower bearings in the aerator motors.

Construction was started on the facilities for lime feeding in conjunction with studies being done on nutrient removal. This program is being financed and administered by the Ontario Water Resources Commission's Research Division.

EXPENDITURE

The operating cost for the year was \$61,387.83, an increase of eight percent over 1969. Areas of increased costs were payroll, power, chemicals, and sludge haulage.

FLOWS

The average daily flow decreased by 0.12 million gallons over 1969. The average daily flow of 1.58 mgd was 79% of design capacity.

The design daily flow was exceeded 10% of the time.

The effluent was disinfected with 14,200 lbs. of chlorine between May and November to give a residual of 0.5 milligrams per litre.

PLANT EFFICIENCY

The average raw sewage BOD and suspended solids concentrations were 200 mg/l and 198 mg/l respectively. These loadings are similar to those of previous years. Average BOD and suspended solids reductions of 96% and 93% respectively represent excellent treatment.

A total of 470 tons of BOD and 523 tons of suspended solids were removed during the year.

The final effluent concentrations of 9 mg/l BOD and 14 mg/l suspended solids are expected for a well operated secondary facility, however OWRC objectives will require even lower concentrations in coming years.

A total of 1042 cubic feet of grit was removed from the raw sewage; an average of 1.75 cubic feet of grit per million gallons of sewage, which is normal.

AERATION

The average concentration of the primary effluent directed to the aeration tanks was 130 mg/l BOD and 109 mg/l suspended solids. The average mixed liquor suspended solids concentration in the aeration tanks was 2,340 mg/l. The food/micro-organism ratio averaged 0.13 which was within the limits of good aeration tank operation.

SLUDGE DIGESTION and DISPOSAL

A total of 2,840,000 gallons of raw sludge was pumped to the digester. The raw sludge averaged 3.4 percent total solids of which 62 percent was volatile matter. Digested sludge averaged 2.7 percent total solids, of which 56 percent was volatile. The average reduction in volatile matter was approximately 28 percent which is below normal. A total of 11,125 cubic yards of digested sludge was hauled from the digester by tank truck. This is considerably higher than previous years and is due to the lower total solids of the digested sludge.

CONCLUSIONS

The project is operating very efficiently, however plans to increase this efficiency to even higher levels are presently under development.

PROJECT COSTS

BOTH STAGE IIs

NET CAPITAL COST (Final)

Newmarket		\$700,694.82	
DEDUCT - Payments from Municipality	\$ 90,000.00		
- Portion financed by CMHC/MDLB (Final)	<u>449,521.34</u>	<u>539,521.34</u>	
Long Term Debt to OWRC			<u>\$161,173.48</u>
East Gwillimbury		\$284,099.63	
DEDUCT - Payments from Municipality		<u>284,099.63</u>	
Long Term Debt to OWRC			<u>\$ Nil</u>
Debt Retirement Balance at Credit (Sinking Fund) December 31, 1969			
Newmarket			<u>\$ 22,104.08</u>
E. Gwillimbury			<u>\$ Nil</u>

BILLINGS

	<u>Newmarket</u>	<u>E. Gwillimbury</u>	
Net Operating	\$42,980.12	\$18,407.71	\$ 61,387.83
Debt Retirement	3,252.00	-	3,252.00
Reserve	4,793.10	1,775.92	6,569.02
Interest Charged	<u>9,029.95</u>	<u>-</u>	<u>9,029.95</u>
	<u>\$60,055.17</u>	<u>\$20,183.63</u>	<u>\$ 80,238.80</u>

RESERVE ACCOUNT

Balance @ January 1, 1969	\$22,941.74	\$ 9,973.15	\$32,914.89
Deposited by Municipalities	4,793.10	1,775.92	6,569.02
Interest Earned	<u>1,597.09</u>	<u>686.86</u>	<u>2,283.95</u>
	\$29,331.93	\$12,435.93	\$41,767.86
Less Expenditures	<u>-</u>	<u>-</u>	<u>-</u>
Balance @ Dec. 31, 1969	<u>\$29,331.93</u>	<u>\$12,435.93</u>	<u>\$41,767.86</u>

BOTH STAGES I and III

NET CAPITAL COST (Final)

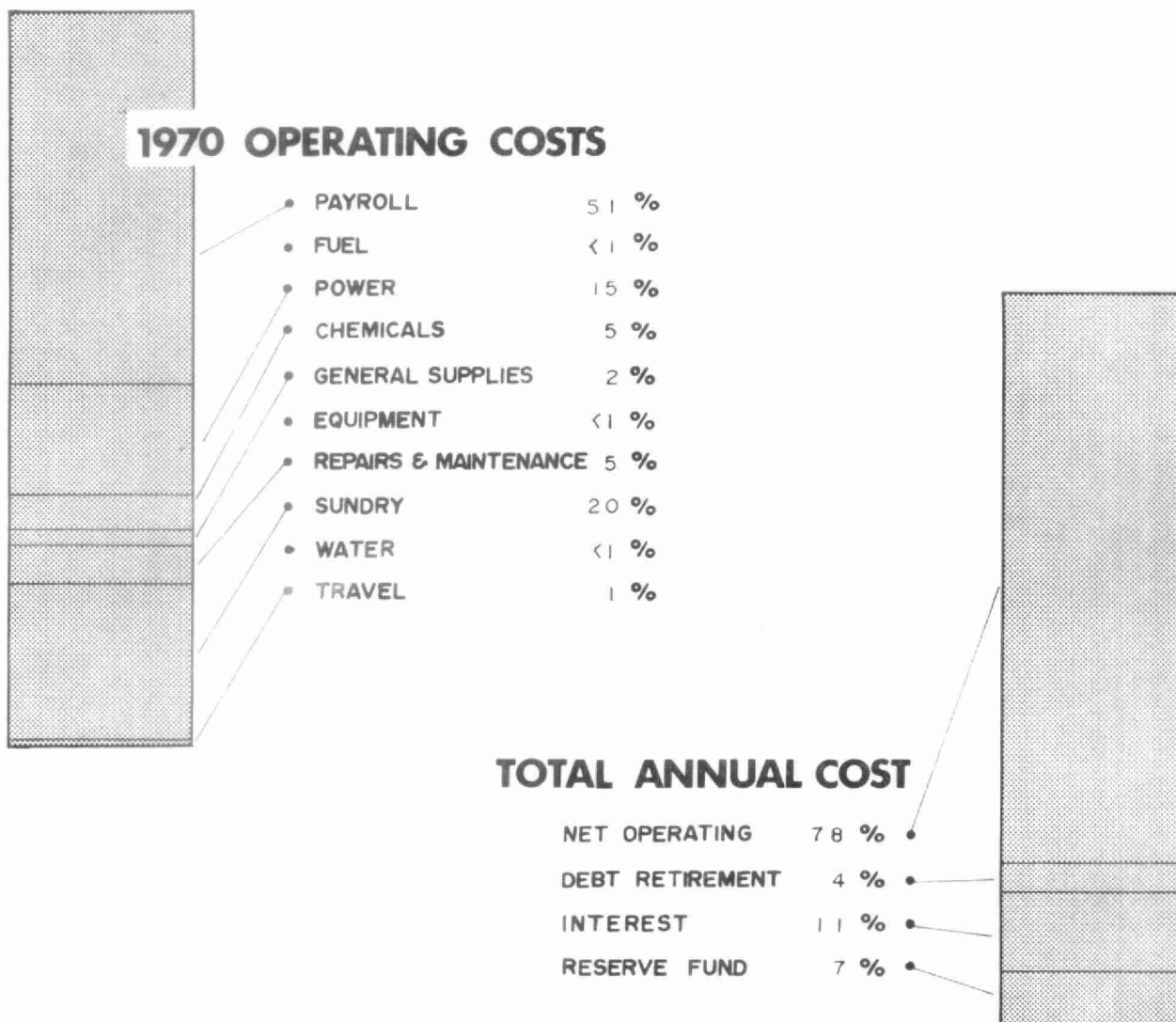
Newmarket	\$124,240.90	
DEDUCT - Portion financed by CMHC/MDLB (Final)	<u>87,807.75</u>	
Long Term Debt to OWRC		<u>\$36,433.15</u>
East Gwillimbury	\$ 23,980.94	
DEDUCT - Payment from Municipality	<u>23,980.94</u>	
Long Term Debt to OWRC		<u>\$ Nil</u>
Debt Retirement Balance at Credit (Sinking Fund) December 31, 1969		
Newmarket		<u>\$ 7,148.70</u>
E. Gwillimbury		<u>\$ Nil</u>

BILLINGS

	<u>Newmarket</u>	<u>E. Gwillimbury</u>	
Debt Retirement	\$ 735.00	\$ Nil	\$ 735.00
Reserve	449.59	111.97	561.56
Interest Charged	<u>2,041.22</u>	<u>Nil</u>	<u>2,041.22</u>
	<u>\$3,225.81</u>	<u>\$111.97</u>	<u>\$3,337.78</u>

RESERVE ACCOUNT

	<u>Newmarket</u>	<u>E. Gwillimbury</u>	
Balance @ Jan. 1, 1969	\$5,003.45	\$1,244.04	\$6,247.49
Deposited by Municipalities	449.59	111.97	561.56
Interest Earned	<u>333.70</u>	<u>87.30</u>	<u>421.00</u>
	\$5,786.74	\$1,443.31	\$7,230.05
Less Expenditures	<u>-</u>	<u>-</u>	<u>-</u>
Balance @ Dec. 31, 1969	<u>\$5,786.74</u>	<u>\$1,443.31</u>	<u>\$7,230.05</u>



Yearly Operating Costs

YEAR	MILLION GALLONS TREATED	TOTAL OPERATING COSTS	COST PER MILLION GAL	COST PER LB OF BOD REMOVED
1966	547.45	\$38,546.14	\$ 70.41	4 cents
1967	606.46	39,215.29	64.66	4 cents
1968	531.39	46,889.60	88.24	5 cents
1969	612.10	56,909.54	93.00	5 cents
1970	578.3	61,387.83	106.15	7 cents

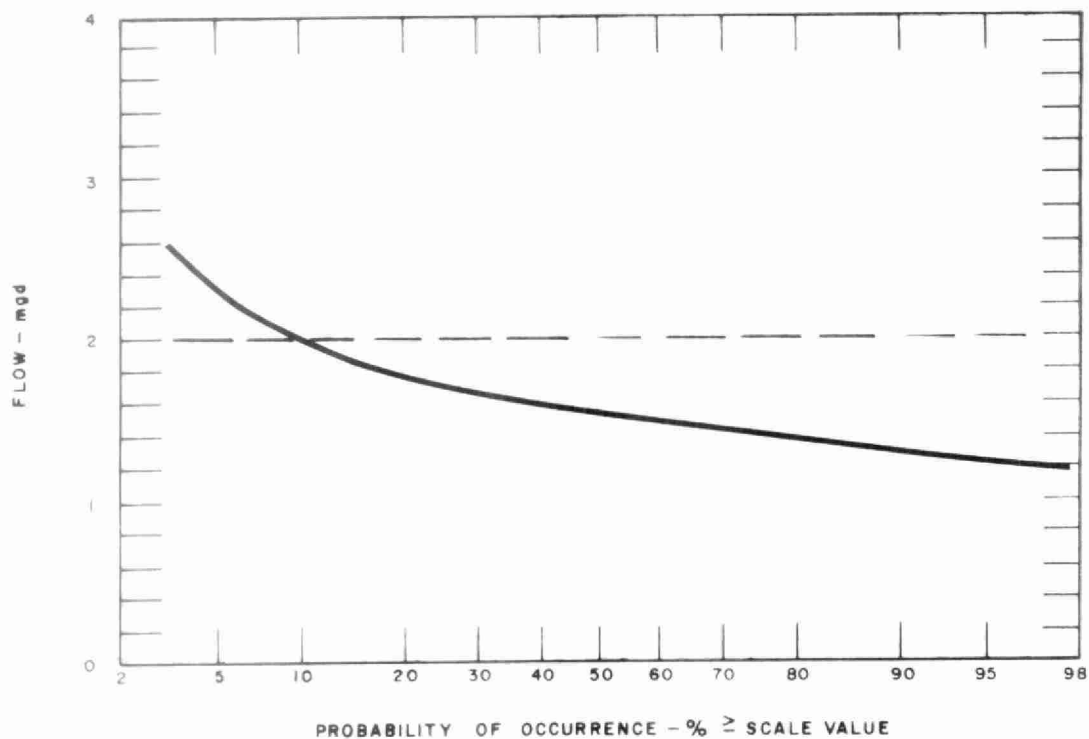
MONTHLY OPERATING COSTS

MONTH	TOTAL EXPENDITURE	PAYROLL	CASUAL PAYROLL	FUEL	POWER	CHEMICALS	GENERAL SUPPLIES	EQUIPMENT	REPAIRS and MAINTENANCE	SUNDRY *	WATER	TRAVEL
JAN	3814.86	3363.95	-	-	-	-	84.09	-	105.92	150.05	30.00	80.85
FEB	4865.90	2408.89	-	-	1590.86	-	79.40	-	-	765.00	-	21.75
MAR	4407.70	2456.79	-	-	698.53	-	136.98	-	305.37	780.03	30.00	-
APR	4668.19	2414.26	-	121.60	789.04	-	90.35	-	113.09	1139.85	-	-
MAY	5368.80	2636.16	-	-	778.54	815.06	65.87	127.47	118.20	720.40	60.00	47.10
JUNE	3385.57	2400.07	-	-	741.82	-	77.74	-	32.40	95.04	-	38.50
JULY	5832.08	2386.29	-	121.60	834.43	407.54	141.00	-	75.73	1704.44	70.00	91.05
AUG	6100.27	3557.29	-	-	814.54	407.54	53.33	-	52.81	1135.16	40.00	39.60
SEPT	5338.08	2365.42	-	-	950.58	-	94.09	-	20.10	1861.79	20.00	26.10
OCT	5562.49	2373.40	-	-	778.36	815.07	159.73	-	372.84	919.06	70.00	74.03
NOV	4610.37	2592.91	-	-	701.10	263.42	74.19	-	97.84	840.91	40.00	-
DEC	7433.52	2330.69	-	-	818.86	435.89	235.17	-	1578.81	1902.05	50.00	82.05
TOTAL	61387.83	31286.12	-	243.20	9496.66	3144.52	1291.94	127.47	2873.11	12013.78	410.00	501.03

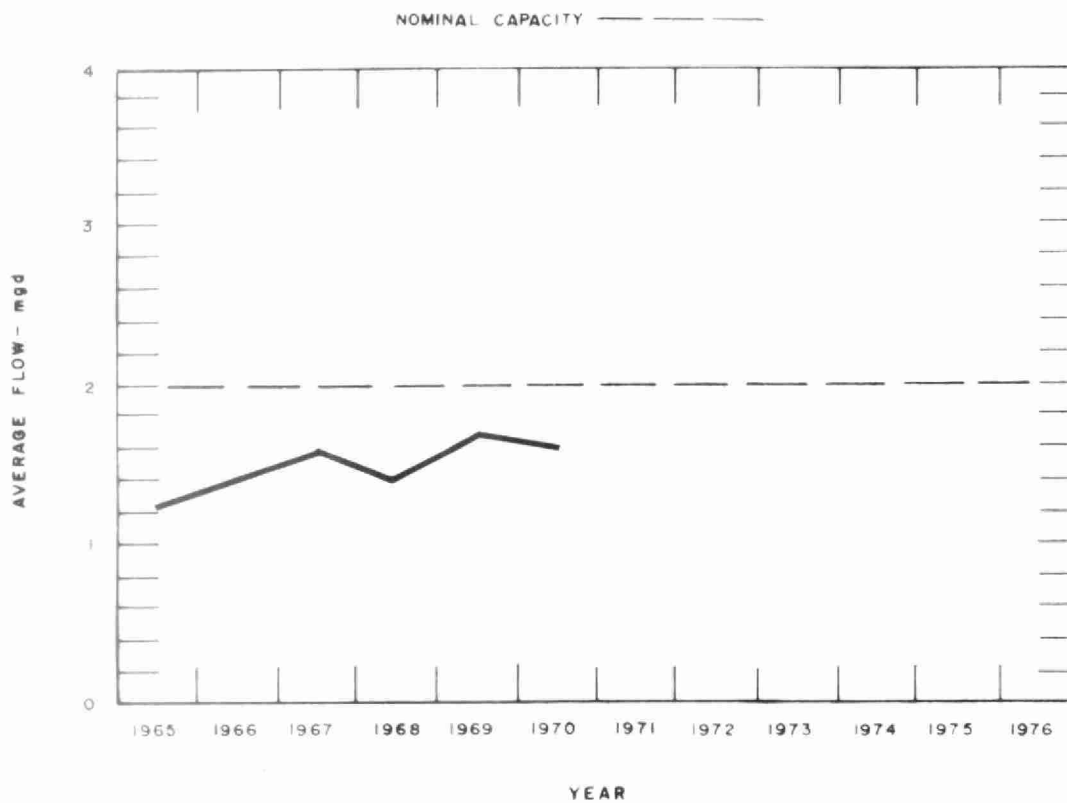
BRACKETS INDICATE CREDIT

* SUNDRY INCLUDES SLUDGE HAULAGE COSTS WHICH WERE \$12,611.70

PROCESS DATA

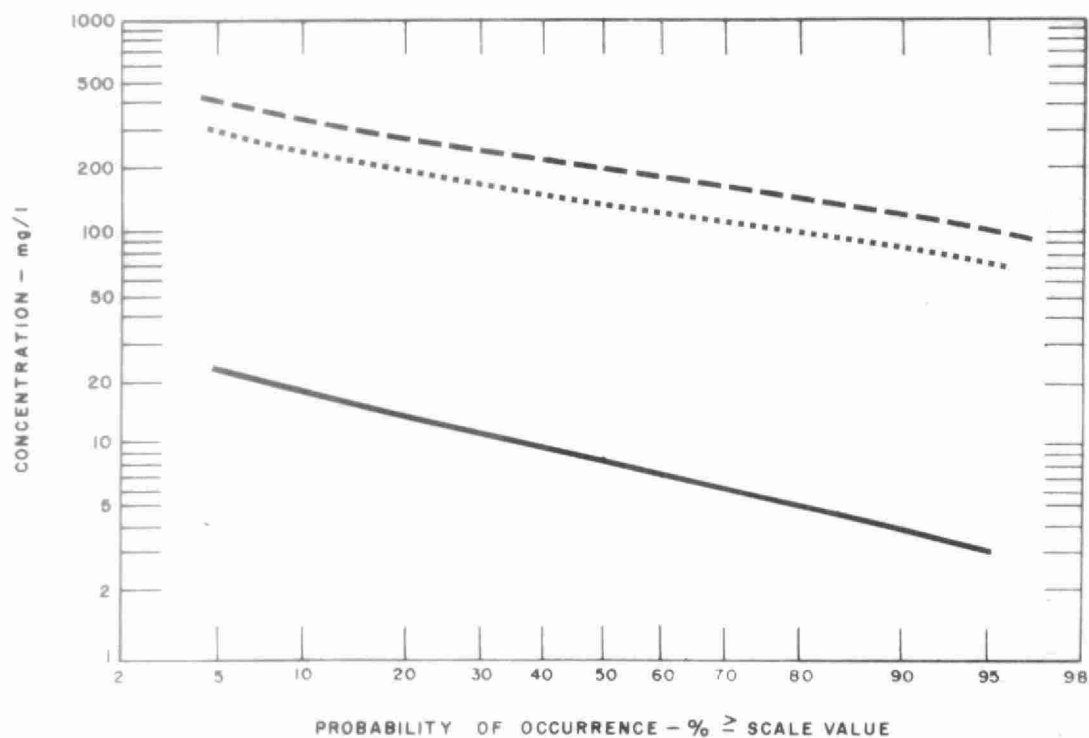


FLAWS

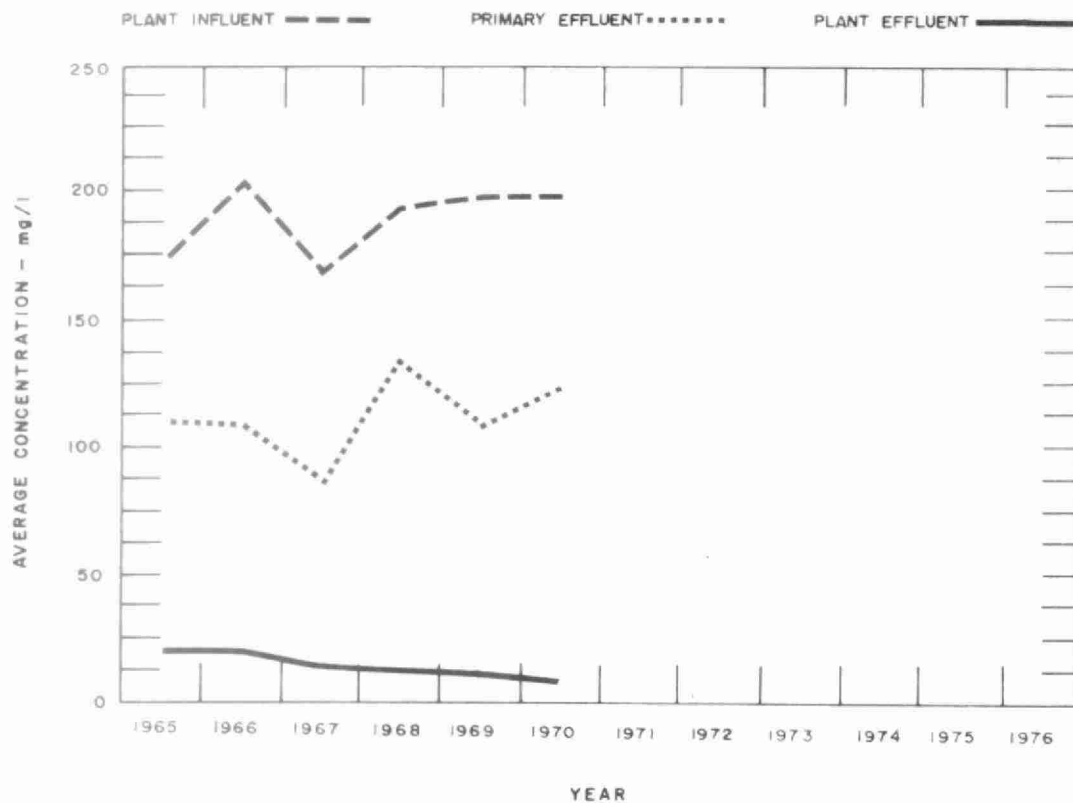


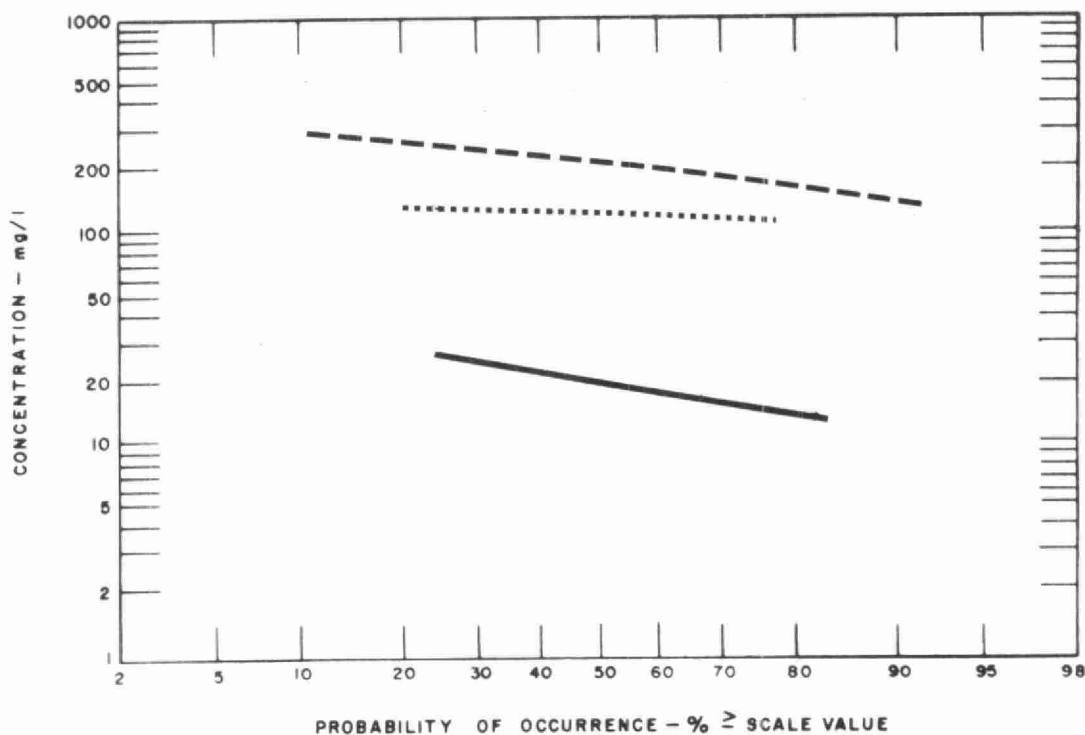
PLANT FLOWS and CHLORINATION

MONTH	TOTAL FLOW mil gal	AVERAGE DAILY FLOW mil gal	MAXIMUM DAILY FLOW mil gal	MINIMUM DAILY FLOW mil gal	CHLORINE USED 10 ³ pounds	DOSAGE mg/l
JAN	42.9	1.38	1.7	1.3	-	-
FEB	48.1	1.72	2.0	1.6	-	-
MAR	58.2	1.88	2.7	1.0	-	-
APR	68.9	2.30	4.4	1.8	-	-
MAY	50.1	1.61	1.8	1.4	1.42	4.5
JUNE	41.8	1.40	1.7	1.2	2.46	5.9
JULY	44.9	1.45	3.3	1.2	2.73	6.1
AUG	40.8	1.32	1.5	1.2	2.62	6.4
SEPT	42.6	1.42	2.0	1.1	2.72	6.4
OCT	44.0	1.46	1.6	1.2	2.25	6.4
NOV	46.9	1.56	2.2	1.3	-	-
DEC	49.1	1.58	2.6	1.3	-	-
TOTAL	578.3	-	-	-	14.20	-
AVERAGE	-	1.58	-	-	2.84	6.0

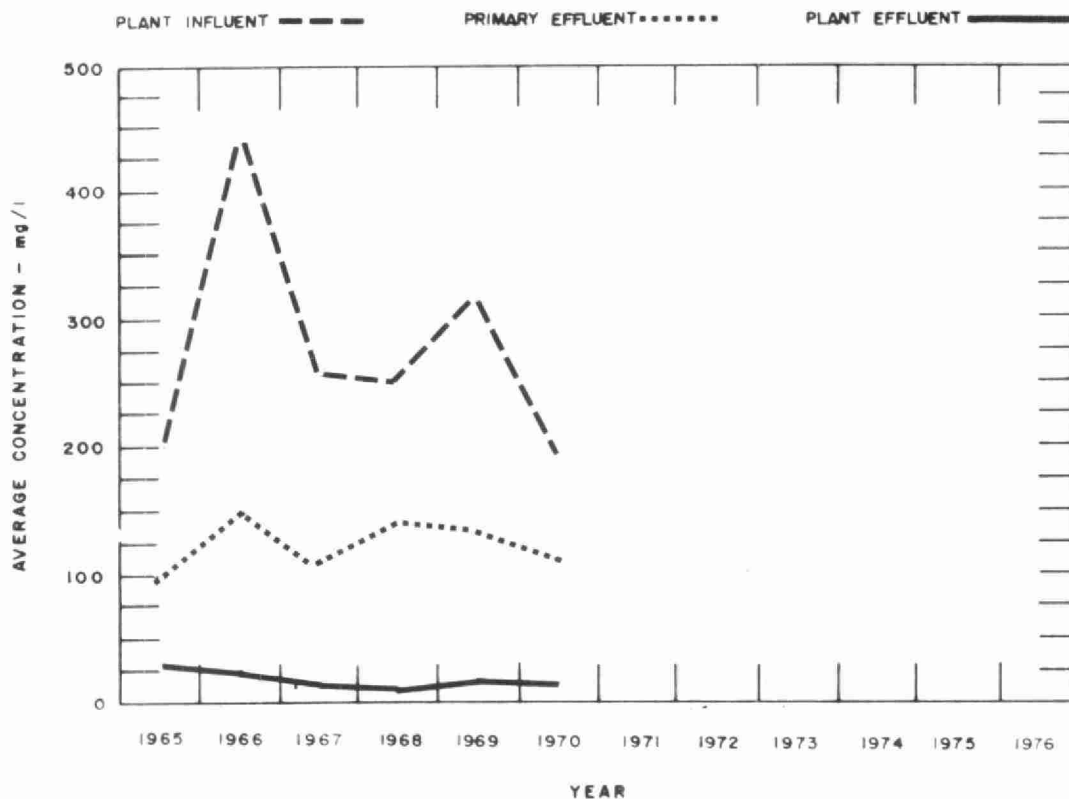


BIOCHEMICAL OXYGEN DEMAND





SUSPENDED SOLIDS



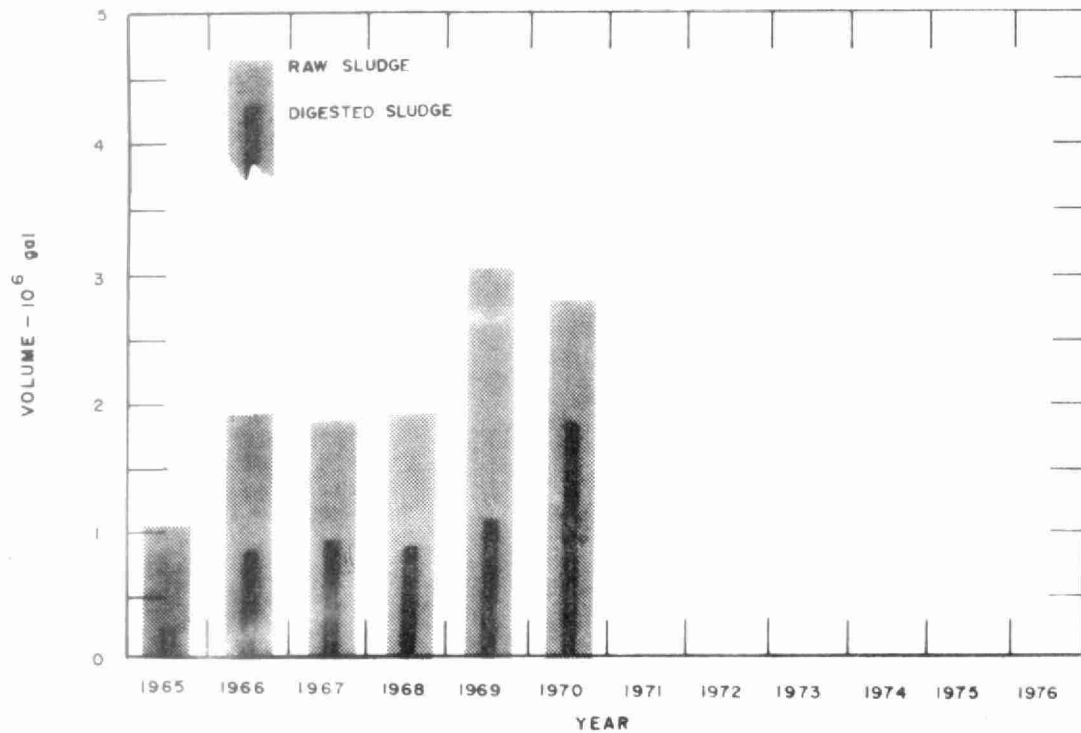
PLANT EFFICIENCY

MONTH	BIOCHEMICAL OXYGEN DEMAND						SUSPENDED SOLIDS						GRIT REMOVED cu ft
	INFLUENT		EFFLUENT		REDUCTION		INFLUENT		EFFLUENT		REDUCTION		
	n	mg/l	n	mg/l	%	10 ³ pounds	n	mg/l	n	mg/l	%	10 ³ pounds	
JAN	1	200	1	11	94	81	1	205	1	20	90	79	74
FEB	1	220	1	14	94	99	1	260	1	20	92	116	82
MAR	1	140	1	6	96	78	1	190	1	10	95	105	92
APR	1	80	1	10	88	48	1	115	1	20	83	66	98
MAY	1	170	1	6	96	82	1	200	1	10	95	95	89
JUNE	1	220	1	4	98	90	1	200	1	5	98	82	95
JULY	1	150	1	3	98	66	1	155	1	15	90	63	88
AUG	1	380	1	5	99	65	1	220	1	5	98	88	86
SEPT	1	200	1	10	95	81	1	250	1	10	96	102	90
OCT	1	220	1	18	92	89	1	220	1	25	89	86	88
NOV	1	220	0	-	-	-	1	210	1	15	93	96	85
DEC	1	200	1	10	95	93	1	150	1	10	93	69	75
TOTAL	12	-	11	-	-	862	12	-	12	-	-	1047	1042
AVERAGE	-	200	-	9	96	78	-	198	-	14	93	87	87

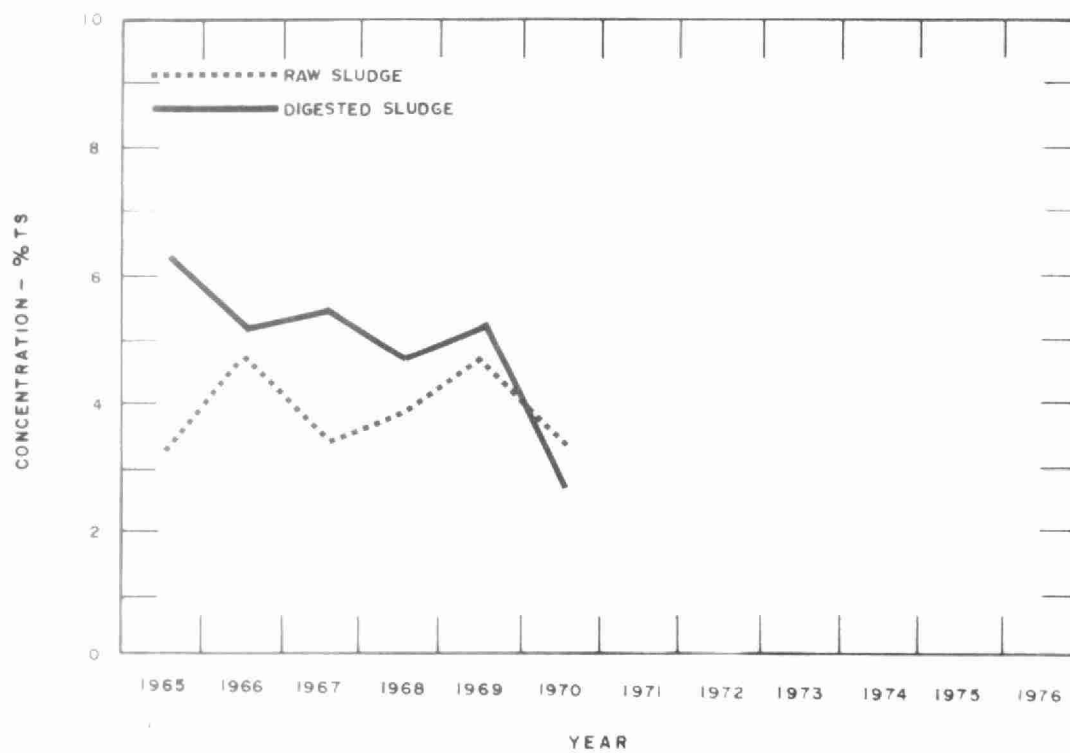
NOTE - n is the number of samples taken

AERATION

MONTH	AVG DAILY FLOW mil gal	AERATION INF.		SECONDY. EFF.		MLSS CONCN mg/l	F/M lb BOD lb MLSS	AIR USED 1000 cu ft lb BOD	WASTE SLUDGE lb/DAY
		BOD	SS	BOD	SS				
		mg/l	CONCN mg/l	mg/l	CONCN mg/l				
JAN	1.4	100	145	11	20	2260	.09		
FEB	1.7	170	140	14	20	2490	.17		
MAR	1.8	80	115	6	10	2630	.09		
APR	2.3	65	70	10	20	2780	.08		
MAY	1.6	140	110	6	10	2140	.15		
JUNE	1.4	100	100	4	5	2260	.09		
JULY	1.4	80	75	3	15	2260	.08		
AUG	1.3	240	140	5	5	2420	.19		
SEPT	1.4	110	70	10	10	2390	.10		
OCT	1.4	170	120	18	25	2700	.13		
NOV	1.6	110	100	-	15	1850	-		
DEC	1.6	190	120	10	10	1840	.24		
TOTAL	-	-	-	-	-	-	-		
AVERAGE	1.6	130	109	9	14	2340	.13		



DIGESTION



SLUDGE DIGESTION and DISPOSAL

MONTH	RAW SLUDGE			DIGESTED SLUDGE			SUPERNATANT		SLUDGE DISPOSAL	
	VOLUME	TOTAL SOLIDS	VOL SOLIDS	VOLUME	TOTAL SOLIDS	VOL SOLIDS	VOLUME	TOTAL SOLIDS	DEWATERED	LIQUID
	10 ⁵ gal	%	%	10 ⁵ gal	%	%	10 ⁵ gal	%	cu yd	cu yd
JAN	2.5	4.7	69	1.4	1.7	56	0	1.0		850
FEB	2.2	4.1	67	1.4	2.8	-	0	.2		810
MAR	2.4	2.5	66	2.0	3.2	50	0	.2		1200
APR	2.2	4.4	63	1.4	3.9	53	0	.1		820
MAY	2.3	4.3	60	1.4	3.2	53	0	.2		860
JUNE	2.2	1.8	39	1.7	2.4	56	0	1.3		1000
JULY	2.2	4.1	46	1.5	3.5	57	0	.1		871
AUG	2.3	4.0	62	1.5	2.5	60	0	-		867
SEPT	2.2	2.5	-	1.6	-	-	0	.4		966
OCT	3.2	2.9	72	1.5	1.8	61	0	.2		875
NOV	2.3	-	-	2.0	2.3	57	0	.4		1182
DEC	2.4	2.5	76	1.4	2.7	58	0	.2		824
TOTAL	28.4	-	-	18.8	-	-	0	-		11125
AVERAGE	2.3	3.4	62	1.5	2.7	56	0	.4		927

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Water management in Ontario

